PSEUDACRIS BRACHYPHONA (COPE), A VALID SPECIES.

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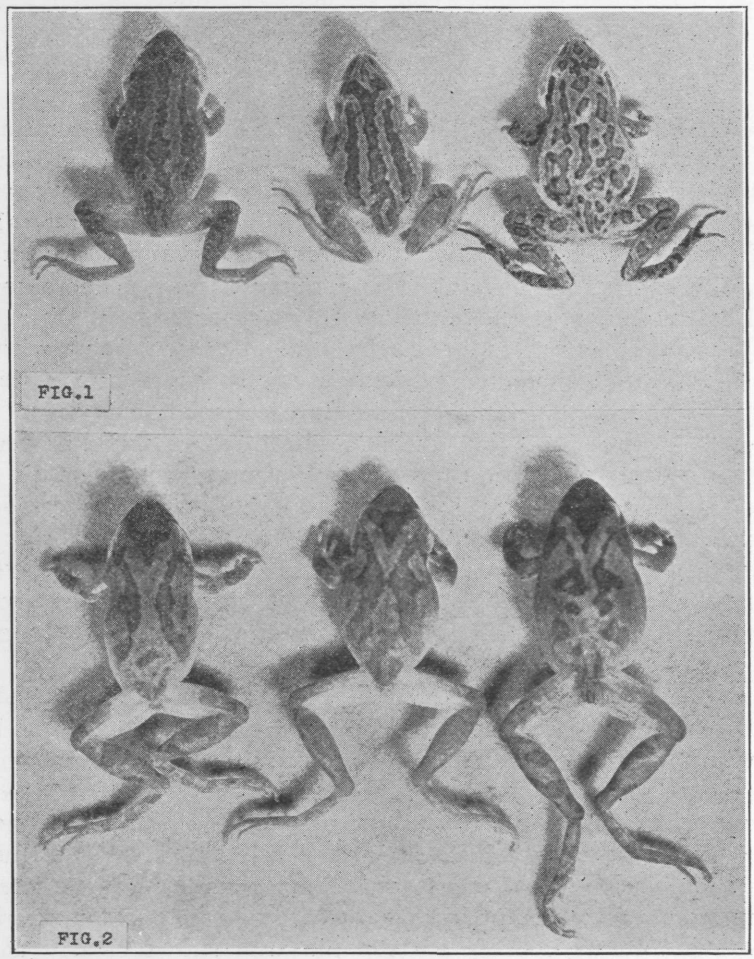
Since the summer of 1928, when Mr. Edward S. Thomas and I first collected specimens of a strange chorus frog in Hocking County, it has been apparent that there are two distinct forms of *Pseudacris* in Ohio. One, which is undoubtedly referable to *Pseudacris triseriata* (Wied), occurs widely over the state and in the western half is one of the dominant frogs. The second and less common species appears to be restricted, in Ohio, to hilly, wooded country, all of the records at present lying within the unglaciated, dissected plateau in the southern and eastern parts of the state. This form differs conspicuously from *P. triseriata* in the proportions of body and limbs, in dorsal pattern, and in color. An attempt to identify this frog has led to an investigation of the status of others in this poorly understood group, and while the validity of some of the named forms is doubtful, it seems certain that our southeastern Ohio *Pseudacris* represents a distinct form which is not currently recognized. It is surely identical with none of the species listed by Stejneger and Barbour in their check list (1923).

In "The Batrachia of North America," Cope (1889, p. 341), described as new a variety of *Chorophilus feriarum*, to which he gave the name *brachyphonus*. The description was based on a single specimen, probably no longer preserved, from "west Pennsylvania, near the Kiskiminitas River." A careful reading leaves no doubt that this description was based on the same frog that occurs in southeastern Ohio. Furthermore, a direct comparison with the types of *Pseudacris feriarum* in the National Museum, and with other eastern material shows clearly that our species is not the same as the one named by Baird. As indicated by Cope there is a general resemblance in proportions, but a marked difference in pattern. Furthermore, living specimens show a difference in color, and the digital discs of *feriarum* are slightly smaller. The Carnegie Museum collection includes a number of specimens from Pennsylvania and West

Virginia which agree closely with the Ohio material, showing beyond doubt that Cope's "variety" *brachyphonus* is actually a valid form with a considerable range.



(Photographs by Edward S. Thomas.)

FIG. 1. *Pseudacris triseriata* (Wied). The two specimens on the left are topotypes, from Mt. Vernon, Indiana. Specimen on the right from Warrick County, Indiana.
FIG. 2. *Pseudacris brachyphona* (Cope). Hocking County, Ohio.

Pseudacris brachyphona (Cope) may be briefly characterized as follows: A medium-sized *Pseudacris* with broad head, long

legs, no median dorsal stripe, ventral and concealed surfaces of the limbs yellowish in life. The width of the head is contained from 2.6 to 3 times in the body length. The length of the tibia is contained from 1.7 to 2 times in the body length. The toe discs are distinct, slightly larger than in *triseriata* or *feriarum;* the webbing of the toes is about as extensive as in those forms; the canthus rostralis is more marked. The vomerine teeth are in two small groups well separated in midline and opposite the posterior border of the nares. The dorsal markings consist of a

MEASUREMENTS OF A SERIES OF *Pseudacris brachyphona* (Cope).

Locality	Catalogue Number	Sex	Body length	Femur	Tibia	Foot	Head length	Head width
Westmoreland County, Penn.	Carnegie, 2028	♂	28	14	15	22	11	11
"	2029	♂	26	13.5	14	20	9.5	10
"	2030	♂	29	14	15	22	10	10.5
"	2031	♂	29	14	15	22	9.5	9.5
"	2032	♂	30	15	16	23.5	9.5	10
Pocahontas County, W. Va.	5339	♂	26	12	13	19	9.5	9.5
Scioto County, Ohio...	O. S. M. 183.1	♂	29	15	16	23.5	10.5	10.5
"	183.2	♂	28.5	14	15.5	23	10	10
"	183.3	♂	27	14	15	21	10.5	10
"	183.4	♂	29	14	15	21	10.5	10.5
"	183.5	♂	28	14.5	15.5	22	10.5	10
Hocking County, Ohio.	203.12	♀	31.5	15.5	16.5	24	10.5	11
"	239.25	♀	33	15	17	23	11	11
"	628.1	♀	31	14.5	15.5	21	10.5	10.5
"	628.2	♀	28	14	14.5	21	10	9.5
Pocahontas County, W. Va.	Carnegie, 5393	♀	33	15.5	17.5	25	10.5	11
"	5349	♀	34	15.5	17.5	25.5	11	11.5

conspicuous triangle between the orbits, and on each side, a broad, crescentic stripe extending posteriorly from the region of the tympanum, curving in towards the middle of the back. In about twenty percent of the specimens examined these stripes fuse in midline, giving rise to a cruciform pattern. Occasionally there is a spot above the vent. As in related species there are some irregularly spotted individuals which show no definite pattern. The limbs are spotted with dark. There are the usual cheek markings: a dark vitta extending back to the shoulder or side, below this vitta a narrow light line, and below this a dark line bordering the jaw. The inferior and

concealed surfaces of the limbs are decidedly yellowish in life. This color is most marked in breeding specimens and is present in both sexes. The vocal sac of the male is dusky anteriorly, this pigment partially obscuring the yellow of the throat. In some large specimens the throat is entirely black. The ground color of the dorsum varies through several shades of brown; in males olive-browns predominate, while the females are usually lighter in color and often exhibit warm reddish browns, reminiscent of those of *Rana sylvatica*. The females are larger than the males, this dimorphism being more apparent than in *triseriata*.

Those specimens which have the dorsal stripes fused in the center of the back show a pattern somewhat suggestive of *Hyla crucifer*. Apparently Cope's type had this pattern. A specimen from Marietta, Ohio (U. S. N. M. 3609) was actually identified as *Hyla pickeringii* (=*Hyla crucifer*) by Cope, and so listed in his work (Cope, 1889, p. 355). Wilcox (1891, p. 134) realizing that he had a peculiar form, described specimens from southern Ohio which were surely *Pseudacris brachyphona*. These too were identified as *Hyla pickeringii* by Cope. These misidentifications must be ascribed to carelessness since the resemblance between the two species is superficial.

It seems remarkable that this frog should have escaped the attention of herpetologists in the northeastern states for so long a period after it was described. A casual search of the literature has revealed only one reference to the name. A specimen of *Pseudacris* in the Field Museum, taken at Meredosia, Illinois, was said by Weed (1923, p. 49) to have a pattern similar to that described by Cope. I have examined this specimen (F. M. N. H. 3266) and have definitely ascertained that it is not *brachyphona*.

Pseudacris triseriata and *P. brachyphona* are known to occur together in Allegheny County, Pennsylvania and in several localities in southern Ohio. In Hocking County, Ohio, where most of my observations have been made, *triseriata* is found only in the larger valleys, filled with glacial outwash from the north. The breeding pools lie chiefly in cultivated land and no specimens have been found above the valleys. *Brachyphona*, in contrast, is essentially sylvan in habit, breeding in temporary pools along small streams and below springs. It ranges up the hillsides as far as such situations are to be found. In the summer months it is most frequently found in deep woods.

Its breeding season begins somewhat later than that of *triseriata* and is more prolonged. Clasping pairs and fresh eggs have been found as early as March 20th and as late as May 12th. In the same region our dates for *triseriata* eggs range from March 14th to April 16th. The eggs of *brachyphona* are much like those of *triseriata* and are laid in similar masses, attached to twigs, leaves, or grasses, often well below the surface of the water. In one small pond near the base of a wooded hill, both species have been found breeding, although not at the same time. The voices of the two are much alike but the call of *brachyphona* is given more quickly, with a higher pitch and a different quality so that the effect of a chorus is quite distinctive.

The known range of *Pseudacris brachyphona*, as indicated by the available material, extends from Beaver County, Pennsylvania (Carn. 2021, 4189) south to Lawrence County, Ohio (O. S. M. 358) and Pocahontas County, West Virginia (Carn. 5125, 5339, 5349), and from Adams County, Ohio (O. S. M. 476) east to Fayette County, Pennsylvania (Carn. 2740–42).* The actual range is doubtless more extensive, especially to the east where the relationship with *Pseudacris feriarum* of the Piedmont has not been studied. A total of one hundred and forty-one specimens has been examined from the area outlined above. Variations in the proportions of the body and limbs in this series are slight. The pattern is also relatively constant. Although there is every gradation from striped to spotted patterns, no specimens have been seen which indicate a transition to the three-striped condition seen in the other northern forms.

In summary, *Pseudacris brachyphona* (Cope) is a well marked species, known from eastern Ohio, West Virginia, western Pennsylvania, and western Maryland. *Brachyphona* differs from *triseriata* and *feriarum* in the absence of a median dorsal stripe, in the slightly larger digital discs, in the yellow color on the limbs, and in the character of the voice. From *triseriata* it also differs notably in proportions. *Triseriata* and *feriarum*, although differing in proportions, agree in lacking yellow on the limbs, and in having, except in spotted individuals, a median dorsal stripe. The voices of these two forms are very similar.

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*Dr. E. R. Dunn, who has independently reached similar conclusions as to the distinctness of *Pseudacris brachyphona*, writes that the Academy of Natural Sciences has six specimens (18767–8, 18776–7, 17824–5) from Jennings, Garrett County, Maryland. This constitutes the easternmost record at present.

Their digital discs are developed to about the same extent. They seem much more closely related to one another than to *brachyphona* and the latter may have been derived from a different stock in the south.

I am indebted to Dr. Leonhard Stejneger and Miss Doris Cochran of the National Museum for assistance in the matter of nomenclature and for the privilege of studying the types of *Pseudacris feriarum*. Mr. M. G. Netting, of the Carnegie Museum, loaned important material from Pennsylvania and West Virginia, and other specimens were examined through the courtesy of Mrs. Helen T. Gaige, of the Museum of Zoology, University of Michigan, and Mr. Karl P. Schmidt, of the Field Museum of Natural History. For the accompanying photographs my best thanks are due Mr. Edward S. Thomas.

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Stejneger, Leonhard and **Thomas Barbour.** 1923. A Check List of North American Amphibians and Reptiles. Second Edition. Harvard University Press.

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Medical Entomology.

This book is a revision of the older work, "Handbook of Medical Entomology," by the same authors. The revision is rather far-reaching and the men have produced a book that has excellent possibilities both as a text and as a handbook. It is one which will also appeal to the more general reader in the field.

The illustrations, which are uniformly good, are very numerous and well distributed. The many diagrammatic drawings add much to the clearness of the text. A valuable feature is the numerous taxinomic keys with their accompanying drawings. There is a sufficient amount of material of a more strictly medical character to lend both interest and value to the work.

The bibliography is extensive and arranged by authors. It might have been more convenient if a topical classification had been used.—D. F. MILLER.

Medical Entomology, by Wm. A. Riley and O. A. Johannsen. xi + 476 pp. New York, McGraw-Hill Book Co., 1932. $4.50.

Animal Biology.

Dr. Woodruff's "Foundations of Biology" has been so favorably received by biologists that the present work, which is a rearrangement of the older editions, should find a ready welcome. This volume, revised and renamed, is limited to animals. New material included consists of synoptic reviews of the principle phyla, and considerable work on human relations. The book is a very complete outline of modern biological viewpoints, including newer work on ecology, adaptation, and similar phenomena. For those interested primarily in the animal side of biology, it is a very workable text. Dr. Baitsell is publishing a laboratory manual to accompany this text.

Animal Biology, by L. L. Woodruff. xii + 513 pp., 296 fig., glossary. New York, The Macmillan Co., 1932. $3.50.